Small Business Innovation Research/Small Business Tech Transfer

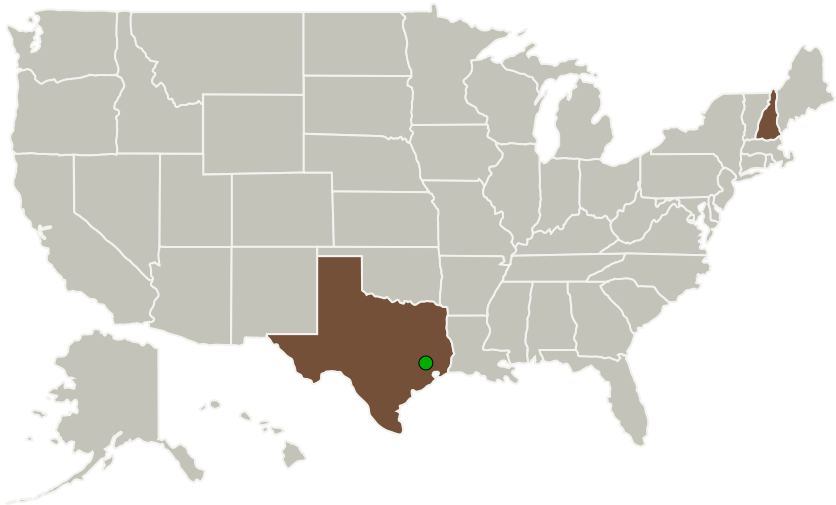
Miniaturized Variable-Pressure Scanning Electron Microscope, Phase I

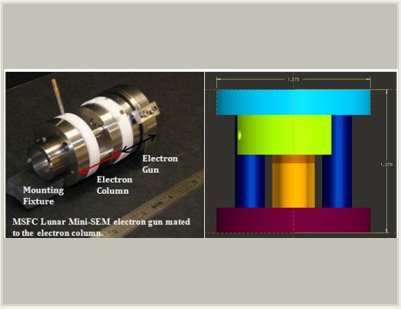
Completed Technology Project (2013 - 2013)

Project Introduction

NASA has recognized the need to develop new on-orbit analysis capabilities. This need arises because of the high cost associated with returning samples to Earth for analysis, the limited availability of crew time, and the relatively modest capabilities and interfaces of the existing hardware on the International Space Station (ISS). The goal of this project is the development of a miniature variable-pressure scanning electron microscope (MVP-SEM) that can be rapidly developed, space qualified, and deployed on the ISS. The MVP-SEM is a cross-cutting tool for in situ topographical imaging and compositional X ray fluorescence mapping of uncoated conductive and non-conductive samples useful to multiple disciplines, including nondestructive imaging of inorganic and organic materials, surface contamination analyses, and scientific studies. We can achieve our goal by leveraging previous NASA investments in the development of an electron gun control system, an electron focusing column design, and scanning and imaging system technology at NASA Marshall Spaceflight Center; a novel cathode from Applied Physics Technologies Incorporated (APTech); and space-qualified vacuum system technology and electronics from Creare. With the head start provided by these previous investments, the MVP-SEM technology will provide flight qualified hardware that is similar to commonly used tools in biological and material science laboratories and could allow for an increased capacity of on-orbit analysis.

Primary U.S. Work Locations and Key Partners





Miniaturized Variable-Pressure Scanning Electron Microscope

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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
New Hampshire	Texas

Project Transitions

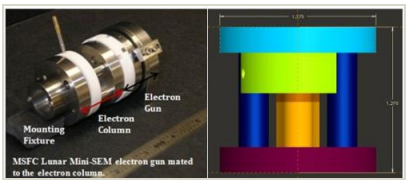
May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138311)*

Images



Project Image
Miniaturized Variable-Pressure Scanning Electron Microscope *(https://techport.nasa.gov/image/134410)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Creare LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Paul H Sorensen

Co-Investigator:
Paul Sorensen

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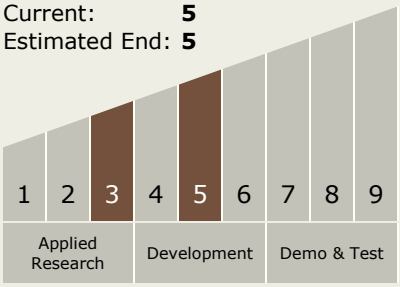
Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.4 Environment Sensors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System